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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,293	05/23/2006	Amir Parham	14113-00011-US	4042
23416 7590 01/05/2010 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899				
EXAMINER				
LISTVOYB, GREGORY				
ART UNIT		PAPER NUMBER		
1796				
MAIL DATE		DELIVERY MODE		
01/05/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/580,293

Applicant(s)

PARHAM ET AL.

Examiner

GREGORY LISTVOYB

Art Unit

1796

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17, 23 and 25-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17, 23 and 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-06)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/28/2009 has been entered.

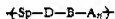
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 rejected under 35 U.S.C. 102(b) as being unpatentable over Fischer et al (US 5212269) herein Fischer (cited in the previous Office Action) in view of Encyclopedia of Polymer Science and Technology (Light-Emitting diodes, vol. 3, pages 87-99, 10/22/2001), herein Encyclopedia.

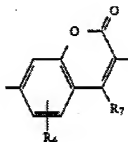
Fischer teaches partially conjugated polymer of the following formula (see Column 3, line 40):



where D-B-A is a chromophoric unit

where D is an amine, A is electron accepting group

Where B is the following (see Column4, line 20):



where R4 and R7 are alkyls.

Coumarin-based polymer, substituted with Alkyls meet the limitations of claims 1-6.

Regarding claims 7-9, Fischer teaches amino-aromatic structures in his polymer (see claims 5-10), which include 1,4 phenylene units.

Fischer does not teach completely conjugated polymers.

Encyclopedia discloses a list of 10 basic requirements for the light emitting diodes, such as high photoluminescence efficiency, high purity, adequate charge -transport characteristics, good processability, etc (see pages 93-94).

Encyclopedia discloses that "This list of fundamental requirements has indeed been a veritable challenge for materials design in terms of synthesis, understanding of structure-property relationships, and processing. **The majority of the vast number of polymeric EL materials investigated to date origins from the family of conjugated**

polymers, ie, macromolecules featuring an extended π -conjugated backbone. Important examples of classes of conjugated polymers used as emitting layer in PLEDs include poly(arylene)s, poly(arylene vinylene)s, and, to some extent, also poly(arylene ethynylene)s".

Encyclopedia further discloses that "In some cases the introduction of flexible "spacer" units between the introduction of flexible "spacer" units between the conjugated moieties which reduce the overall rigidity of the polymer backbone and leading to improved solubility."

All the above factors improve processability of the polymer in exchange for decreasing its light emitting ability (due to decreasing concentration of chromophores in the polymer). Therefore, both conjugated and non-conjugated polymers are well known as materials for light emitting diodes. The advantage of totally conjugated polymer i.e. its superior light emitting ability is recognized by the art.

The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) , 325 U.S. at 335, 65 USPQ at 301, see also also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960), *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988) and MPEP 2144.07.

Therefore, it would have been obvious to a person of ordinary skills in the art to interchangeably use both conjugated polymers and ones with non-conjugated spacers depending on the exact application. In particular, when the superior light emitting ability is needed, the completely conjugated polymers are preferred.

Claims 1-15, 17-19, 23, 25-28 rejected under 35 U.S.C. 103(a) as being unpatentable over Treacher et al (WO 2002/077060, cited with equivalent US 7288617) herein Treacher in combination with and Chen et al (US 20030164499) herein Chen as evidences by Yun et al (US 5650456) herein Yun

Treacher discloses a polymer, comprising units with the following formula (see Column 3, line 60):



Formula (II)

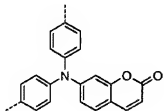
where Ar 1, Ar 2 and Ar 3 can represent benzene, naphthalene or heterocyclic aromatics (see Column 8, line 55).

Regarding Claim 2, 3 and 5, Treacher does not specifically disclose a location of Structure 1 in the polymer chain. However, based on synthesis conditions (they are analogous in Treacher and in the Application), the above structure can be incorporated both in main and side chain of the polymer.

In reference to Claim 4, 6, 7-8, 9-11, 13-14 Treacher discloses a homo- and copolymers (having at least 1% mol of structure of Formula III, see Column 6, line 55), further fragments with the following units: 1, 4 naphthalenes, triarylaminines, pyridines , etc (see Claim 16 and 19).

Treacher teaches that his material can be used as hole-transporting and/or electron transporting layer (see Abstract). In particular, Treacher teaches that his material can be used as a light emitting layer (see Column 19, line 65), meeting new limitation of Claim 1.

Treacher's structure has the same arylamine fragment as a polymer of the Application examined (see Claim 28, Formula 21 of the Application examined):



Formula (21)

The only difference between Structures (III) and (21) is that Treacher's polymer has phenyl or naphthalene fragment instead of Coumarine's one of the Application. Note that both polymers are parts of Light Emitting Diodes (LED) (see Spec and Busing, line 0001, meeting the limitations of Claim 23, 25-26).

Chen discloses fluorescent bis-coumarines with the above Formula (21) (see Abstract). Chen uses his compounds for LED.

Chen teaches that his compound combines well known photoluminescence properties of coumarine with good thermostability, provided with arylamine (see line 0004).

As evidences by Yun, electroluminescent polymers (see Column 7, line 65) having coumarine units (see Abstract) are known.

Regarding Claims 17-19, Chen teaches that coumarine-containing compound can be used in amount from 0.1 to 5 %wt based on the weight of the emissive layer, comprising one or more polymers (see Claim 9).

Therefore, it would have been obvious to a person of ordinary skills in the art to incorporate Chen's coumarine-containing units into Treacher's polymer in order to combine photoluminescence properties of coumarine with good thermostability, provided by arylamine.

Response to Arguments

Applicant's arguments filed 10/14/2009 have been fully considered but they are not persuasive.

Applicant argues that in contrast to the disclosure of Fischer, according to the Applicant's claim 1 only "conjugated polymers, oligomers and dendrimers" are claimed, which do not only contain a conjugated unit, but are conjugated in total.

The newly added reference (Encyclopedia) discloses use of both completely conjugated and spacer-containing polymers. Note that rejection under 35 USC 102(b) is replaced by one based on 35 USC 103(a) as a result of Applicant's remarks.

In addition, Applicant's statements is incorrect. For instance, Structures M1-M4 contain non-conjugated aliphatic fragments (see page 17 of Specification).

Applicant argues that Treacher does not teach light emitting unit, but hole-transporting one.

This is incorrect. Treacher teaches that his material can be used both as hole-transporting and/or electron transporting layer (see Abstract). In particular, Treacher teaches that his material can be used as a light emitting layer (see Column 19, line 65), meeting the new limitation of Claim 1.

Applicant submits that Treacher's polymer has almost the same structure as one of Comparative Example VI, which shows poor photoluminescence.

However, as evidences by Yun, electroluminescent polymers (see Column 7, line 65) having coumarine units (see Abstract) are known. Chen's modification of Treacher's polymer is used to increase its photoluminescence properties.

Therefore, introduction of these units into Treacher's polymer improves its electroluminescence ability, which is well-known and recognized by the Prior Art.

The same argument is applicable in reference to a life span of the light emitting unit, since coumarin moieties are responsible for this parameter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Seidleck/
Supervisory Patent Examiner, Art Unit 1796
GL